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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/595,791
Filing Date: May 11, 2006
Appellant(s): SEMMLINGER ET AL.

John James McGlew
For Appellant

EXAMINER'S ANSWER

This is in response to the Supplemental Appeal Brief filed 11/2/09 appealing from the Office action mailed August 13, 2008.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

US 3954215	Takagi et al.	5-1976
US 3542383	Farley	11-1970

US 3439853 Deemie et al. 4-1969

(9) Grounds of Rejection

The following ground(s) of rejection (modified in light of entry of amendment after final) are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. **Claims 1-5, 7, 9-11, 13-19 and 21** are rejected under 35 U.S.C. 103(a) as being unpatentable over Takagi et al. (US 3954215, of record) in view of Farley et al. (US 3542383, of record).

a. **Regarding claim 1**, **Takagi et al. ("Takagi")** discloses a friction welding machine (fig. 1) including:

i. frame 2;

ii. main platform 3 (i.e. first headstock) with spindle 9 having a workpiece holder 12 and a spindle drive 1;

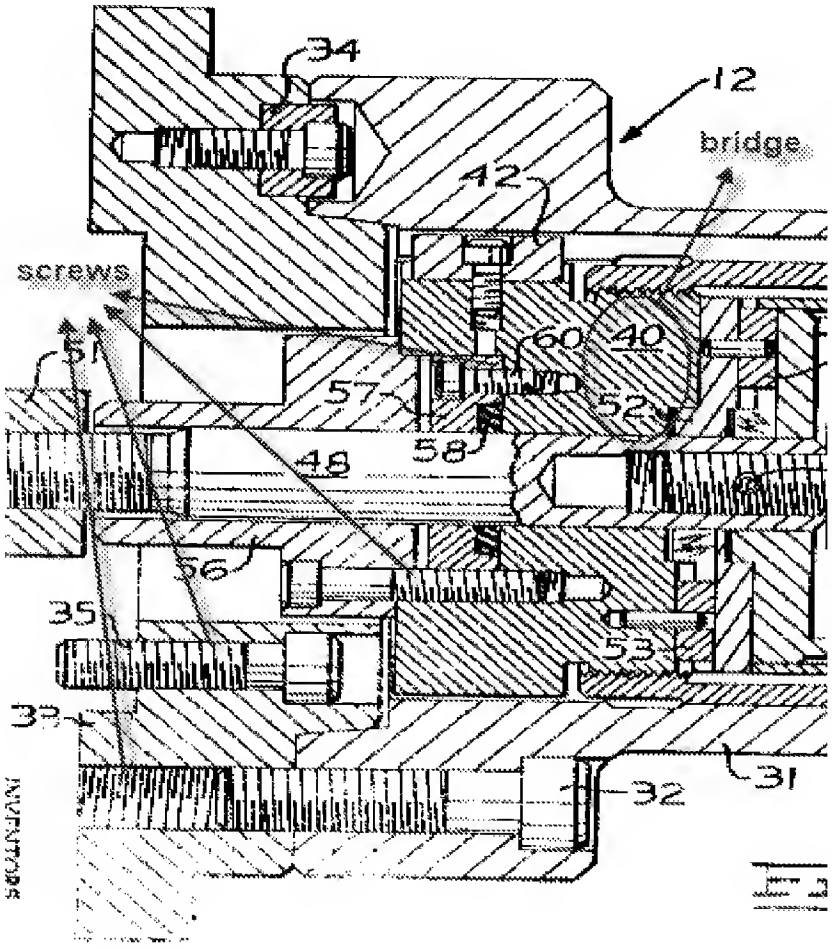
iii. feed drive 19 with second workpiece holder 28; and

iv. another platform 15 (i.e. second headstock) with spindle 24, spindle drive 20; the second headstock is mounted axially movably on frame 2 and is connected to feed drive 19.

b. Takagi does not disclose at least one of the workpiece holders having a bridge, such that at least one of the workpiece holders does not receive the forge force and the torque produced by friction welding. **Farley et al. ("Farley")** is drawn to chuck (i.e. workpiece holder) assembly for inertia welding machine (inertia welding is analogous to friction welding). Farley discloses the workpiece holder 12 (fig. 1) including a backup support plate 52/52' and the actuator block 40/40' [figs. 2-3]. It is also noted that the support plate 52 of Farley is substantially similar to the bridge support plate 33 of the Applicant (fig. 4). Thus, and actuator block 40 receive the axial thrust force during friction welding (col. 3, lines 15-17) and are collectively equivalent to a "bridge". Since the bridge of Farley is structurally same as that of Applicant's bridge, it is reasonably expected to absorb torque/forge forces so that the spindle does not receive such forces. Moreover, inner chuck sleeve 37 and outer chuck sleeve 36 receive the additional thrust force, exerting a clamping force on the workpiece wp-1 which prevents the rotation of wp-1 within the chuck and avoids distortion or damage to wp-1 while it is experiencing substantial interactions forces with wp-2 (col. 3, lines 18-30).

c. With respect to limitation of "positive-locking support", Farley discloses the bridge having screw connections as shown below and such screws are

equivalent to “positive-locking support” for connection to at least one headstock since they are substantially same as Applicant’s positive-locking support (pins 35 in fig. 4). It is also noted that the claim does NOT require the positive-locking support being in direct contact with the bridge/carrying body.



d. It would have been obvious to a person of ordinary skill in the art at the time of the invention to substitute the workpiece holder of Takagi (12) by the workpiece holder of Farley (12) because such holder prevents relative rotation of

the workpiece within the holder and avoids distortion or damage to the workpiece during friction welding (Farley- abstract; col. 3, lines 26-30).

e. **As to claim 2**, Takagi discloses that the main platform 3 is fixedly mounted on bed 2 (i.e. stationary; col. 2, line 60).

f. **As to claims 3 & 4**, the apparatus of Takagi is adapted to work with different materials and sizes of the workpieces (col. 5, line 60). Accordingly, the spindles would have to be of different sizes to be compatible with a variety of workpieces. It would have been obvious to a person of ordinary skill in the art to supply spindles of different sizes in the friction welding machine of Takagi because it provides the flexibility of welding workpieces of different sizes.

g. **As to claim 5**, Takagi discloses that the rotation and moment of inertia of second spindle are controlled in order to adjust the friction welding energy under welding conditions such as material and diameter of workpieces (col. 4, lines 25-60). Since both spindle systems are provided with drive motors, it follows that either spindle drive can have lower load and thus, be weaker than the other. Both spindle systems quickly synchronize with each other, and the variation of sum of the lengths of both workpieces after welding can be reduced to minimum (line 48). It would have been obvious to one skilled in the art to have weaker spindle drive to accommodate varying workpieces and selectively control the process as shown by Takagi because doing so improves the quality of welded workpieces.

h. **As to claim 7,** the workpiece holder of Farley is mounted rigidly in relation to the bridge [fig. 2].

i. **As to claim 9,** screw connections of Farley encompass pins and openings for engaging carrying body and at lease one headstock.

j. **As to claim 10**, Farley discloses removable chuck to permit employment of the chuck assembly with solid workpieces (claim 2). It would have been obvious to a person of ordinary skill in the art to provide detachable workpiece holder in the apparatus of Takagi in order to accommodate various workpieces.

k. **As to claim 11**, Takagi discloses similar workpiece holders 12 & 28 (fig. 1).

l. **As to claim 13**, Takagi discloses feed drive 19 mounted and supported at column 18 of frame 2.

m. **As to claim 14**, Takagi discloses column 18 and stationary headstock 3 connected by tie rod 17.

n. **As to claim 15**, Takagi discloses the feed drive being a hydraulic cylinder 47 (fig. 6).

o. **As to claim 16**, Takagi discloses electric drive motor 1.

p. **As to claims 17-18,** Farley discloses spindle drive having a conventionally known inertial weight 24 (i.e. flywheel; Fig. 1). It would have been obvious to an artisan of ordinary skill at the time of the invention to include flywheel masses on stationary spindle drive because the flywheels store the energy to be consumed at the interface of weld pieces during the friction welding operation.

q. **Regarding claim 19, Takagi** discloses a method of operating a friction welding machine comprising;

v. providing plurality of spindle heads (3, 15) with spindles (6, 9, 24), spindle drives (1, 19) and workpiece holders (12, 28);

vi. feed drive 17 for movably mounted spindle head 15.

vii. Takagi does not provide a bridge wherein one of the spindles is relieved of axial forge and welding forces. However, **Farley** discloses such a "bridge" in the workpiece holder, connected to a headstock as explained in claim 1 above [figs. 2-3]. Farley discloses workpiece holder 12 being removable from the spindle 17 (screw connection), and providing a bridge 52/40 with a workpiece holder attached thereto, placed over the spindle and connected to a headstock. It would have been obvious to a person of ordinary skill in the art at the time of the invention to substitute the workpiece holder of Takagi (12) with the workpiece holder of Farley (12) because such holder prevents relative rotation of the workpiece within the holder and avoids distortion or damage to the workpiece during friction welding (col. 3, lines 26-30).

r. **Regarding claim 21, Takagi** discloses a friction welding machine (fig. 1) including:

viii. frame 2;

ix. first headstock 3 with a first spindle 9 having a workpiece holder 12 and a spindle drive 13 being mounted on the first headstock;

x. feed drive 19 with a second workpiece holder 28, wherein a portion of the feed drive is in contact with the frame through support plate [fig. 1];

xi. a second headstock 15 having a second spindle drive 20 mounted thereto and a second spindle 21, the feed drive extending through the second headstock such that second workpiece holder is located on one side of 15, the second headstock is mounted axially movably on frame 2.

s. Takagi does not disclose at least one of the workpiece holders having a bridge, such that at least one of the workpiece holders does not receive the forge force and the torque produced by friction welding. **Farley** is drawn to chuck (i.e. workpiece holder) assembly for inertia welding machine (inertia welding being analogous to friction welding). Farley discloses the workpiece holder 12 (fig. 1) including a backup support plate 52/52' and the actuator block 40/40' [figs. 2-3]. It is also noted that the support plate 52 of Farley is substantially similar to the bridge support plate 33 of the Applicant (fig. 4). Thus, and actuator block 40 receive the axial thrust force during friction welding (col. 3, lines 15-17) and are collectively equivalent to a "bridge". Since the bridge of Farley is structurally same as that of Applicant's bridge, it is reasonably expected to absorb torque/forge forces so that the spindle does not receive such forces. Moreover, inner chuck sleeve 37 and outer chuck sleeve 36 receive the additional thrust force, exerting a clamping force on the workpiece wp-1 which prevents the rotation of wp-1 within the chuck and avoids distortion or damage to wp-1 while it is experiencing substantial interactions forces with wp-2 (col. 3, lines 18-30). It

would have been obvious to a person of ordinary skill in the art at the time of the invention to substitute the workpiece holder of Takagi (12) with the workpiece holder of Farley (12) because such holder prevents relative rotation of the workpiece within the holder and avoids distortion or damage to the workpiece during friction welding (col. 3, lines 26-30).

2. **Claim 12** is rejected under 35 U.S.C. 103(a) as being unpatentable over Takagi et al. in view of Farley et al. as applied to claim 1 above, and further in view of Deemie et al. (US 3439853).

t. Takagi or Farley does not disclose a second headstock having a traveling carriage mounted at frame. However, **Deemie** et al. (drawn to friction welding apparatus) discloses traveling carrier 72 mounted at frame 78 and connected to second workpiece WP2 (fig. 1). It would have been obvious to an artisan of ordinary skill at the time of the invention to provide screw-driven carrier of Deemie et al. in the apparatus of Takagi because small movements of the carrier, and consequently the headstock can be easily and accurately controlled (col. 4, lines 1-9).

(10) Response to Argument

With regard to the ARGUMENT section beginning on pg. 9 of the Appeal Brief, the Appellant has provided arguments addressing the 35 USC 103(a) rejections of claims 1-5, 7, 9-11, 13-19, and 21 under Takagi (US 3954215) in view of Farley (US 3542383). Appellant's arguments against the cited art are addressed as follows:

1. Appellant argues (last paragraph on pg. 11 of the brief) that Farley fails to teach at least one workpiece holder having a bridge wherein the bridge receives torque and forge forces during friction welding such that at least one of the spindles does not received the forces produced via friction welding. Appellant further states (pg. 12) that the spindle 17 of Farley would inevitably absorb torque forces during friction welding since there is no connection between the chuck assembly 12 and the housing 11.

Examiner respectfully disagrees. Examiner contends that the backup plate (52) and block (40) in the workpiece holder 12 are collectively equivalent to a bridge and such is structurally similar to support plate 33 of the claimed bridge (present fig. 4). Farley discloses: "***Axial thrust applied by the workpiece WP-2 against the workpiece WP-1 is transferred to the backup plate 52 and then into the actuator block 40" (col. 3, lines 15-17).*** Therefore, it is the Examiner's position that the bridge of Farley is reasonably expected to absorb torque and forge forces so that the spindle upstream does not receive such forces because the apparatus of Farley as modified is structurally indistinguishable from the claimed apparatus.

2. Appellant argues (pg. 12) that the claimed invention significantly increases the service life of the spindle and allows dramatic increase in the speed of rotation, while Farley fails to disclose such advantages since Farley does not teach a structure that receives torque. In response, Examiner contends that Farley discloses a structure (backup plate and block 52/40) which receives axial forging forces and consequently, such structure is expected to provide the asserted advantages.

3. Appellant argues (first paragraph on pg. 13) that even though the workpiece wp-1 is supported at backup plate 52, the backup plate 52 and block 40 are pushed to the left by the upsetting force during friction welding and this transmits a force to the spindle 17 of Farley. Examiner contends that nowhere Farley discloses that the backup plate and block are pushed to left by the upsetting forces during welding, transmitting forces to the spindle, and so there is no factual basis for such argument. Regardless of leftward movement, structurally similar bridge of Farley is reasonably expected to absorb torque and forge forces so that the spindle upstream does not receive such forces. Appellant further argues that a person of ordinary skill in the art would understand that axial upsetting forces in Farley would be transmitted to the spindle 17 since the chuck assembly 12 as a whole is fastened to the spindle 17. In response, Examiner points out that Farley's objective is to provide an improved chuck assembly that is **responsive to welding thrust pressure between two workpieces and increases the clamping forces on the workpiece**, thus effectively securing the workpiece and maintaining its dimensional stability (**col. 1, lines 30-38**). One of ordinary skill in the art reading Farley as a whole would understand and appreciate that axial forging forces in Farley are rather channeled to increase the clamping forces on the workpiece and avoids distortion or damage to the workpiece. Since the backup plate and block in the chuck assembly of Farley are structurally similar to the bridge support plate of the Applicant, the chuck assembly of Farley is reasonably expected to absorb torque and forge forces so that the spindle upstream does not receive such forces.

4. Appellant argues that (bottom paragraph on pg. 13) capscrews (32/35) of

Farley do not provide any positive locking-support for connecting the bridge to at least one headstock. In response, Examiner notes that amended limitation in claim 1 concerning "positive-locking support" is clarified in the rejection set forth above. The screw connections of Farley (fig. 2, also shown above) are equivalent to "positive-locking support" for connection to at least one headstock since they are substantially same as Applicant's positive-locking support – pins 35 (fig. 4). Moreover, Examiner points out that the instant claim does NOT require the positive-locking support being in direct contact with the bridge/carrying body.

5. With respect to claim 3-4, Appellant argues that (last paragraph on pg. 14) Takagi does not disclose spindles having different sizes (i.e. one being smaller than the other). Examiner agrees that Takagi does not expressly disclose two spindles having different sizes, however, Takagi discloses that welding energies of the main spindle system and the subordinate spindle system are selectively controlled depending on welding conditions such as materials and diameters of the workpieces (col. 5, lines 55-61; col. 4, line 29). An artisan of ordinary skill would understand that spindle sizes of the main and subordinate spindles of Takagi would be different in order to be compatible with different workpiece diameters. One skilled in the art would have been motivated to provide two different spindle sizes in the apparatus of Takagi in order to weld workpieces of different diameters.

6. With respect to claim 7, Appellant argues that (last paragraph on pg. 16) even though the workpiece wp-1 is supported at backup plate 52, the backup plate 52 and block 40 are pushed to the left by the upsetting force during friction welding and this

transmits a force to the spindle 17 of Farley. Examiner contends that nowhere Farley discloses that the backup plate and block are pushed to left by the upsetting forces during welding, transmitting forces to the spindle, and so there is no factual basis for such argument. Regardless, since the backup plate and block in the chuck assembly of Farley are structurally similar to the bridge support plate of the Applicant, the chuck assembly of Farley is reasonably expected to absorb torque and forge forces so that the spindle upstream does not receive such forces.

7. With respect to claim 9, Appellant argues that (pg. 17) Farley does not teach positive-locking connection with pins and openings. Examiner respectfully disagrees. As shown above, the screw connections (including 32/35) of Farley are equivalent to pins of claimed positive-locking support for connection of bridge to at least one headstock.

8. With respect to claim 10, Appellant argues Farley does not teach at least one workpiece holder is detachably connected to a spindle. Examiner disagrees. Farley discloses that that the inner chuck (i.e. workpiece holder) is removable (i.e. detachable) from the chuck assembly (col. 4, lines 27-29).

8. With respect to claims 13-14, Appellant argues that (pg. 19) support plate 18 of Takagi is not a column of a frame 2 since 18 is a separate element that does not form a portion of frame 2. In response, Examiner contends that in accordance with broadest reasonable interpretation, plate 18 supported on frame 2 (fig. 1 of Takagi) is equivalent to a column of the frame 2.

9. With respect to claims 17-18, Appellant argues that (pg. 21) member 24 of Takagi is equivalent to a flywheel mass. It appears that Appellant has inadvertently

misinterpreted the rejection. The rejection cites inertial weight 24 (flywheel- fig. 1) of the **Farley reference, NOT Takagi**.

10. With respect to claim 19, Appellant argues (pg. 24) that even though the workpiece wp-1 is supported at backup plate 52, the backup plate 52 and block 40 are pushed to the left by the upsetting force during friction welding and this transmits a force to the spindle 17 of Farley. Examiner contends that nowhere Farley discloses that the backup plate and block are pushed to left by the upsetting forces during welding, transmitting forces to the spindle, and so there is no factual basis for such argument. Regardless of leftward movement, structurally similar bridge of Farley is reasonably expected to absorb torque and forge forces so that the spindle upstream does not receive such forces. Appellant further argues that a person of ordinary skill in the art would understand that axial upsetting forces in Farley would be transmitted to the spindle 17 since the chuck assembly 12 as a whole is fastened to the spindle 17. In response, Examiner points out that Farley's objective is to provide an improved chuck assembly that is **responsive to welding thrust pressure between two workpieces and increases the clamping forces on the workpiece**, thus effectively securing the workpiece and maintaining its dimensional stability (**col. 1, lines 30-38**). One of ordinary skill in the art reading Farley as a whole would understand and appreciate that axial forging forces in Farley are rather channeled to increase the clamping forces on the workpiece and avoids distortion or damage to the workpiece. Since the backup plate and block in the chuck assembly of Farley are structurally similar to the bridge support

plate of the Applicant, the chuck assembly of Farley is reasonably expected to absorb torque and forge forces so that the spindle upstream does not receive such forces.

11. With respect to claim 21, Appellant argues (pg. 26) that Farley fails to teach at least one workpiece holder having a bridge wherein the bridge receives torque and forge forces during friction welding such that at least one of the spindles does not received the forces produced via friction welding. Appellant further states (pg. 12) that the spindle 17 of Farley would inevitably absorb torque forces during friction welding since there is no connection between the chuck assembly 12 and the housing 11. Examiner respectfully disagrees. Examiner contends that the backup plate (52) and block (40) in the workpiece holder 12 are collectively equivalent to a bridge and such is structurally similar to support plate 33 of the claimed bridge (present fig. 4). Farley discloses: "***Axial thrust applied by the workpiece WP-2 against the workpiece WP-1 is transferred to the backup plate 52 and then into the actuator block 40***" *(**col. 3, lines 15-17**).* Therefore, it is the Examiner's position that the bridge of Farley is reasonably expected to absorb torque and forge forces so that the spindle upstream does not receive such forces. Appellant also argues (pg. 27) that clutch means 13 of Takagi is not equivalent to first spindle drive. In response, Examiner contends that in accordance with broadest reasonable interpretation, clutch means 13 are equivalent to spindle drive since they control the driving speed of the spindle (Takagi- col. 5, lines 7-12).

In summary, the 35 USC 103(a) rejections set forth above renders the claimed invention obvious, and it is the Examiner's position that the rejections be maintained.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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Examiner, Art Unit 1793

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